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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/636,100	08/10/2000	Mary Dominique O'Neill	99W075	6344

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EXAMINER

SPEARS, ERIC J

ART UNIT PAPER NUMBER

2878

DATE MAILED: 02/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/636,100

Applicant(s)

O'NEILL ET AL.

Examiner

Eric J Spears

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16 is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☒ Claim(s) 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abell et al. (4,323,925).

Regarding Claims 1 and 4, Abell teaches a sensor system for viewing light energy from a scene 10, comprising: a detector 17 (Fig. 3) which converts incident light energy into an electrical signal, the detector including an imaging detector array (See Claim 8); an optical train 11 (Fig. 3) that focuses the light energy of the scene; and an optical fiber bundle 31 (Fig. 3) having an input end that receives the scene from the optical train and an output end that directs the energy of the scene onto the detector array, the optical fiber bundle comprising a plurality of optical fibers (Col. 4, lines 26-41). Abell does not teach the exact contour of each fiber, wherein each fiber has an input shape and size at its input end and an output shape and size at its output end, the output shape and size being different from the input shape and size. However, the size of the ends of the fiber and the shape of the ends of the fibers would have been an obvious design choice to one of ordinary skill in the art. For example, although Abell does not show the individual fibers change in size perpendicularly to the axis of the fiber, it would have been obvious to one of ordinary skill in the art to provide fibers which

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expand toward one end, to minimize loss of light at the larger end of the fiber bundle. Like wise, a change in the shape of the fiber end would have required only routine skill in the art. Therefore, it would have been obvious to one ordinary skill in the art to provide fiber bundles comprising individual fibers wherein each fiber has an input shape and size at its input end and an output shape and size at its output end, the output shape and size being different from the input shape and size, in order to minimize loss of light and to provide for use of a larger array of detectors. Further, it would have been obvious to one of ordinary skill in the art, to provide the fiber input size of each respective optical fiber is larger than the fiber output size of that optical fiber, as an obvious design choice given Abell teaches the fiber bundle being wider at the input end, in order to ensure that substantially all light impinging on the input end of the fiber bundle is delivered to the detectors.

Regarding Claim 3, the modified device of Abell does not teach the exact shape of the ends of the fibers. However, it would have been obvious to provide the input shape of each fiber is substantially in the form of a rectangle and the output shape is substantially in the form of a square, as an obvious design choice given the shape of the ends of the fiber bundles taught in Abell, in order to ensure that substantially all light impinging on the input end of the fiber bundle is delivered to the detectors.

Regarding Claim 5, the modified device of Abell teaches image-processing electronics (Col. 3, lines 66-68). Abell does not explicitly teach an electronic device operable to read the electrical signal of the detector. However, Abell also teaches the detector array being a CCD sensor (Col. 3, lines 33-40). Therefore, it would have been

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obvious to one of ordinary skill in the art to provide for readout electronics, as the use of electronics to readout pixilated detectors is well known in the art, especially considering Abell teaches the detector may comprise an electro-optical scanner (Col. 3, lines 33-40).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abell et al. (4,323,925) in view of Kern et al. (4,701,624).

Regarding Claim 2, Abell does not teach a color filter. However, Kern teaches a detector which acts as a filter for certain wavelengths in a fiber optic sensor. Therefore, it would have been obvious to one of ordinary skill in the art to provide a filter positioned between the scene and the detector, as the use of filters is well known in the art as shown by Kern in order to filter light from emitters which are not of interest.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abell et al. (4,323,925) in view of McKinley (5,715,345).

Regarding Claim 6, Abell does not teach scene light energy mapped non-linearly onto the detector. However, McKinley teaches optical fiber remapping. Therefore, it would have been obvious to one of ordinary skill in the art to provide for non-linear mapping of scene light energy onto the detector array, as such remapping is well known in the art as shown by McKinley, in order to provide more uniform or other prescribed distribution of light.

Claims 7-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abell et al. (4,323,925) in view of Kern et al. (4,701,624).

Regarding Claims 7, 12, and 13, Abell teaches a sensor system for viewing light energy from a scene 10, comprising: a detector 17 (Fig. 3) which converts incident light energy into an electrical signal, the detector including an imaging detector array (See Claim 8); an optical train 11 (Fig. 3) that focuses the light energy of the scene; and an optical fiber bundle 31 (Fig. 3) having an input end that receives the scene from the optical train and an output end that directs the energy of the scene onto the detector array, the optical fiber bundle comprising a plurality of optical fibers (Col. 4, lines 26-41). Abell does not teach the exact contour of each fiber, wherein each fiber has an input shape and size at its input end and an output shape and size at its output end, the output shape and size being different from the input shape and size. However, the size of the ends of the fiber and the shape of the ends of the fibers would have been an obvious design choice to one of ordinary skill in the art. For example, although Abell does not show the individual fibers change in size perpendicularly to the axis of the fiber, it would have been obvious to one of ordinary skill in the art to provide fibers which expand toward one end, to minimize loss of light at the larger end of the fiber bundle. Like wise, a change in the shape of the fiber end would have required only routine skill in the art. Therefore, it would have been obvious to one ordinary skill in the art to provide fiber bundles comprising individual fibers wherein each fiber has an input shape and size at its input end and an output shape and size at its output end, the output shape and size being different from the input shape and size, in order to minimize loss

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of life and to provide for use of a larger array of detectors. Further, it would have been obvious to one of ordinary skill in the art, to provide the fiber input size of each respective optical fiber is larger than the fiber output size of that optical fiber, as an obvious design choice given Abell teaches the fiber bundle being wider at the input end, in order to ensure that substantially all light impinging on the input end of the fiber bundle is delivered to the detectors.

Further regarding Claim 7, Abell does not teach two color filters, each filter over a different bundle with the two bundles imaging onto two regions of the same detector. However, Kern teaches a detector 48 which acts as a filter for certain wavelengths in a fiber optic sensor, as well as the use of a separate filter 49 (Col. 6, lines 42-51). Therefore, it would have been obvious to one of ordinary skill in the art to provide a filter positioned between the scene and the detector, as the use of filters is well known in the art as shown by Kern in order to filter light from emitters which are not of interest. Kern also teaches the use of two detectors (Col. 6, lines 17-33) detecting different colors from a single source to differentiate between a target light source and extraneous light sources. Abell teaches multiple detectors each with a fiber bundle. Moreover, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Therefore, it would have been obvious to one of ordinary skill in the art to provide fiber two bundle/filter devices, each bundle with individual fibers which have different input and output size and shapes, wherein the respective filters pass first and second colors, as the use of multiple detectors and filters is well known in the art, as shown by Kern and

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Abell and as the duplication of the fiber bundle/detector/focusing device would require only routine skill in the art, in order to distinguish a target light source from non-target sources using two colors which have significant wavelength overlap. It also would have been obvious to one of ordinary skill in the art to provide a single imaging detector, where the first and second bundles image onto two different regions of the single detector, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893).

Regarding Claim 8, the modified device of Abell does not teach the specific sensitivities. However, if, for example, the first detector was not responsive to light passes by the second color filter, the first filter would not be necessary to provide for light source discrimination (and vice versa). Therefore, it would have been obvious to one of ordinary skill in the art to provide a detector where both regions are sensitive to both colors. Moreover, the use of such a detector would also be obvious because a detector which had two different sensitivities in different regions would be more costly.

Regarding Claim 9, the modified device of Abell does not teach the first-color and the second-color regions are in the same plane. However, it would have been obvious to one of ordinary skill in the art to provide the two regions in a plane, as Abell teaches an group of imaging detectors in a common plane (Fig. 3).

Regarding Claims 10 and 11, the modified device of Abell does not teach the exact shape of the ends of the fibers. However, it would have been obvious to provide the input shape of each fiber is substantially in the form of a rectangle and the output

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shape is substantially in the form of a square, as an obvious design choice given the shape of the ends of the fiber bundles taught in Abell, in order to ensure that substantially all light impinging on the input end of the fiber bundle is delivered to the detectors.

Regarding Claim 14, the modified device of Abell teaches image-processing electronics (Col. 3, lines 66-68). Abell does not explicitly teach an electronic device operable to read the electrical signal of the detector. However, Abell also teaches the detector array being a CCD sensor. Therefore, it would have been obvious to one of ordinary skill in the art to provide for readout electronics, as the use of electronics to readout pixilated detectors is well known in the art, especially considering Abell teaches the detector may comprise an electro-optical scanner (Col. 3, lines 33-40).

Allowable Subject Matter

Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 16 is allowed.

The following is an examiner's statement of reasons for allowance: regarding Claim 16, the prior art fails to teach or reasonably suggest a sensor system for viewing scene comprising, in addition to the other related features of the claim, a single imaging detector with a first-color region and a second-color region, a first-color imaging system as recited in Claim 16, lines 4-17, and a second-color imaging system as recited in

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Claim 16, lines 18-32, the first-color and the second-color being different in wavelength, and both imaging systems mapping scene energy nonlinearly using tapered optical fibers changing in shape and size.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tosswill (4,099,833) shows a optical fiber bundle with fibers changing size and shape.

Tho (6,292,608) shows a fiber bundle detector system changing size.

Sonehara et al. (5,053,765) shows a fiber bundle detector system changing size.

Boxen (6,271,510) shows a detector system with fiber remapping.

Masaaki (JP 60-058521)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Spears whose telephone number is (703) 306-0033. The examiner can normally be reached on Monday-Friday from 9:00am to 5:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seungsook Ham can be reached on (703) 308-4090. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

EJS
02/22/02


STEPHONE ALLEN
PRIMARY EXAMINER